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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/591,423

09/01/2006

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EXAMINER

LACLAIR, DARCY D

ART UNIT

PAPER NUMBER

1796

MAIL DATE

DELIVERY MODE

08/29/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/591,423	Applicant(s) KOHNO ET AL.	
	Examiner Darcy D. LaClair	Art Unit 1796	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above claim(s) 7-12 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-6 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☒ Claim(s) 1-13 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01 September 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>7/03/08, 3/24/08, 3/30/07, 9/1/06</u> . | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Election/Restrictions

1. Restriction is required under 35 U.S.C. 121 and 372.

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1.

In accordance with 37 CFR 1.499, applicant is required, in reply to this action, to elect a single invention to which the claims must be restricted.

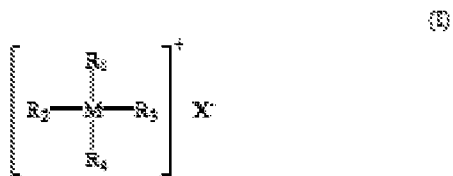
Group I, claim(s) 1-6, drawn to a polyester resin composition.

Group II, claim(s) 7-11, drawn to a molded article.

Group III, claim(s) 12-13, drawn to a process for production of a polyester resin.

2. The inventions listed as Groups I - III do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons:

3. The basis for holding lack of unity between groups I, II, and III is as follows: The technical feature which is common to the three groups of inventions is the polyester composition of claim 1, comprising a polyester and a laminar silicate. Applicant requires as the broadest claim, a polyester resin composition comprising a polyester and a laminar silicate that is 60-100% modified by an organic phosphonium ion, where the content of laminar silicate is 0.01-20% wt. as inorganic ash and the terminal OH group content is 0.1 -45 eq/ton. Lan et al. (US 2002/0028870) teaches a polymer-clay nanocomposite comprising a melt-processable matrix polymer and a layered clay with a low quartz content. (abs) The polymer may be any melt-processable polymer or oligomer, and is illustrated by polyesters. (par 58) The clay materials include natural, synthetic, and modified phyllosilicates. (par 84) and they are treated by an organic cation which is represented by formula (I),



(pg 7)

where M is can be phosphorous, and R1, R2, R3, and R4 are organic and/or oligomeric ligands or hydrogen, specifically linear or branched alkyl groups having 1 to 22 carbons, aralkyl groups which are benzyl and substituted benzyl moieties including fused-ring moieties, and others. (par 97-98) This is consistent with applicant's organic phosphonium ion. Example 1 indicates that the final material was analyzed for ash content, and it was determined to be 2.53%. (par 157) Applicant indicates that the improved terminal -OH content is obtained by polycondensation of a dicarboxylic acid and a diol (applicant's par 30) rather than conventional methods, as well as the presence of the laminar silicate. (applicant's par 35) Lan teaches that the polyester of the invention may comprise a polycondensation reaction product (par 60) and it is then used in combination with the treated clay (applicant's laminar silicate). The polycondensation and combination with a laminar silicate significantly mirrors applicant's invention, and would therefore yield a similar terminal -OH group content. Therefore, since the limitations tying these groups fail to define a contribution over Lan et al. (US 2002/0028870), they fail to constitute a special technical feature and hence there is a lack of unity between the cited groups.

4. During a telephone conversation with Bruce Kramer on Aug 22, 2008 a provisional election was made **with traverse** to prosecute the invention of Group I, claims 1-6. Affirmation of this election must be made by applicant in replying to this Office action. Claims 7-13 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

5. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Claim Objections

6. Claim 1 is objected to because it does not end in a period. Claims must begin with a capital letter and end in a period. MPEP 608.01(m).

Claim Rejections - 35 USC § 112

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. Claim 4 and 6 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 4 requires at least 50% of a laminar silicate of specific characteristics. It is unclear whether this is with respect to the content of the laminar silicate or with respect to the content of the entire composition. Additionally, is this 50% by weight, or volume, or some other measure? Claim 6 requires a resin composition according to claim 1, characterized in that the quartz content is no greater than 0.009 wt%. Is this the content of the silica component only, or the content of the resin composition?

Claim Rejections - 35 USC § 102

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

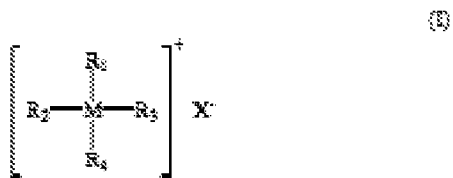
10. Claims 1-6 are rejected under 35 U.S.C. 102(b) as being anticipated by Lan et al. (US 2002/0028870)

11. Claim 1 requires a polyester resin composition comprising a polyester and a laminar silicate that is 60-100% modified by an organic phosphonium ion, where the content of laminar silicate is 0.01-20% wt. as inorganic ash and the terminal OH group content is 0.1 -45 eq/ton, where the phosphonium ion is as shown:



(wherein R_1 , R_2 , R_3 , and R_4 each independently represent a C1-30 hydrocarbon group or a hetero atom-containing hydrocarbon group, and any from among R_1 , R_2 , R_3 , and R_4 may form a ring.)

Lan teaches a polymer-clay nanocomposite comprising a melt-process able matrix polymer and a layered clay with a low quartz content. (abs) The polymer may be any melt-processsable polymer or oligomer, and is illustrated by polyesters. (par 58) The clay materials include natural, synthetic, and modified phyllosilicates. (par 84) and they are treated by an organic cation which is represented by formula (I),



where M is can be phosphorous, and R1, R2, R3, and R4 are organic and/or oligomeric ligands or hydrogen, specifically linear or branched alkyl groups having 1 to 22 carbons, aralkyl groups which are benzyl and substituted benzyl moieties including fused-ring moieties, and others. (par 97-98) This is consistent with applicant's organic phosphonium ion. Lan teaches that a complete cation exchange can be accomplished in approximately 1-2 hours. (par 47) Example 1 indicates that the final material was analyzed for ash content, and it was determined to be 2.53%. (par 157) Applicant indicates that the improved terminal -OH content is obtained by polycondensation of a dicarboxylic acid and a diol (applicant's par 30) rather than conventional methods, as well as the presence of the laminar silicate. (applicant's par 35) Lan teaches that the polyester of the invention may comprise a polycondensation reaction product (par 60) and it is then used in combination with the treated clay (applicant's laminar silicate). The polycondensation and combination with a laminar silicate significantly mirrors applicant's invention, and would therefore yield a similar terminal -OH group content.

12. Claim 2 requires that the polyester is one or more selected from the group consisting of polyethylene terephthalate, polytrimethylene terephthalate, polybutylene terephthalate, and polyethylene-2,6-naphthalate. Lan teaches that the primary dibasic acids include terephthalic acid and naphthalene-2,6-dicarboxylic acid, (par 63) and the

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preferred glycols include ethylene glycol, 1,4-butane-diol. (par 64) These components, put through a polycondensation polymerization reaction, (par 60) would yield applicant's polyesters.

13. Claim 3 requires that the temperature for 5% weight loss of the modified laminar silicate at a temperature elevating rate of 20°C/min or higher in a nitrogen atmosphere is 310°C or higher. Applicant teaches that the laminar silicate may preferably be a smectite clay mineral, including montmorillonite. Lan teaches a montmorillonite-type clay. (par 35) This is treated with a substantially similar cation. (see discussion with regard to claim 1) This would lead to a modified laminar silicate that behaves in a similar manner with regard to weight loss as measured by gravimetric analysis.

14. Claim 4 requires the composition to contain at least 50% of a laminar silicate with an interlayer distance d_B of 2.0 nm or greater, and an average number of layers N_B no greater than 5. Lan teaches that the platelet particles (a single layer) of the clays preferably have a thickness of less than about 2 nm (pre-dispersion measurement), (par 85) and the clays are preferably dispersed as individual platelet particles and small tactoids (stacks), having a thickness in the smallest dimension of less than 20 nm. This suggests that the interlayer distance once incorporated into the polyester would be greater than 2.0 nm, because the incorporated thickness is significantly more than the layer thickness. (par 86) Additionally, being the same starting material (smectite clays), treated in the same manner (phosphonium ion), and incorporated in a similar resin (polyester resin of similar building blocks) suggests that the ability of the silicate, which is in the same size range, to behave in a similar way.

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15. Claim 5 requires the calcium content of the laminar silicate to be no greater than 0.5%. Lan teaches a preference for pure or purified clays. (par 43) Lan further teaches that a complete cation exchange of the clay (applicant's layered silicate) can be accomplished in approximately 1-2 hours (par 47) and that longer reaction times allow complete exchange of the cations as well as removal of impurities. (par 49) This cation exchange would remove the cation Ca^+ (calcium) as well as others.

16. Claim 6 requires a composite with a quartz content of no greater than 0.009 wt%. Lan is particularly focused on the quartz content of the montmorillonite clay, and purified clays are preferred. (par 37) A clay processed according to the Lan's invention should have less than about 0.5% by weight of quartz particles. Once incorporated into the resin, that number would be reduced further. Lan's nanocomposite comprises up to 25% weight of clay, (par 83) which would mean up to 0.125% quartz in the composition, however this is the maximum value allowed, and Lan is clear on the negative effects of quartz. (par 33) It is clear that the intent of the invention and related processes is to reduce the quartz content. Given that 0.125% is a maxim, and the goal is to reduce the quartz content as much as possible, it is clear that Lan would be in the same general range as applicant.

Conclusion

17. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

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18. Ellsworth (US 5,962,553) which discloses nanocomposites made from organophosphonium cation modified layered clay and a melt-processable polymer.

19. Susuki et al. (WO00/60006, also available as US 7,138,453) which discloses a polyester resin composition with a layered phyllosilicate.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Darcy D. LaClair whose telephone number is (571)270-5462. The examiner can normally be reached on Monday-Thursday 7:30-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vasu Jagannathan can be reached on 571-272-1119. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Darcy D. LaClair
Examiner
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/DDL/

/Vasu Jagannathan/

Supervisory Patent Examiner, Art Unit 1796